# Project Summary Information Page

i. **Project Title:** Evaluation of Food Waste Preprocessing and Implementation of Co-digestion in the City of Oxnard Anaerobic Digesters

ii. **Applicant Name.** The City of Oxnard

iii. **DUNS Number.** 081790214

iv. **Project Summary.** The State of California Department of Resources Recycling and Recovery (CalRecycle) has required the implementation of mandatory organic recycling (MORe) program for all jurisdictions in the State. To support the mandate, promote sustainability and generate renewable energy, this project proposes to perform a feasibility evaluation to preprocess City's organic waste and deliver it to the City's wastewater treatment plant anaerobic digesters for co-digestion.

v. **Contact Information: (**Include name, title, address, email address, phone number. You can list both a primary and an administrative contact.)

[redacted] Primary Contact
[redacted]

[redacted] Administration
[redacted]

***Exemption 6: Personal Privacy***

vi. **Total Project Cost:** $246,256

vii. **Funding Requested:** $182,630.

viii. **Project Period:** 10-1-2020 to 9-15-2022

# Evaluation of Food Waste Pre-processing and Implementation of Co-digestion in the City of Oxnard Anaerobic Digesters

## Criterion 1: Project Summary and Approach (30 points)

### 1a. Project Description

The City of Oxnard ("City") provides water, wastewater and environmental services to a population of about 210,000. The City's Environmental Resources (ER) Division is responsible for collection, processing and transfer of residential, commercial and industrial solid waste, recyclables, green waste, and food waste within the City boundaries. The ER Division also operates the City's Del Norte Regional Recycling and Transfer Station (Del Norte) which is a material recovery facility (MRF). The Del Norte facility is permitted to accept 2,779 total tons per day of solid waste, recyclables, green waste, and food waste materials. Currently, this facility receives, processes and transfers an average of 1,100 tons per day of solid waste.

The State of California Department of Resources Recycling and Recovery (CalRecycle) has required the implementation of a mandatory organic recycling (MORe) program for all jurisdictions in the State. This mandate is defined in California Assembly Bills AB-1826. AB-1826 mandates that jurisdictions begin a program to divert organics from landfills as of January 2016. Organics as stated here includes green waste materials for commercial and multi-family residential dwellings (more than 5 units) and commercial food waste materials. The Del Norte facility currently handles approximately 21,316 tons of green waste and 838 tons of organic waste per year. However, the City estimates collection and processing of approximately 57,000 tons per year of food waste at full program participation. In addition to AB 1826, California Assembly Bill AB 32 which mandates reduction of greenhouse gas emissions (GHG) to 1990 levels by 2020 and 80% of 1990 levels by 2050, and senate bill SB 1383 which requires diversion of 50 and 75% of organic waste from landfills, from the 2014 levels, by 2020 and 2025, also require organic diversion from landfills.

Currently, the City's food waste materials are processed through a private contract where food waste is shipped offsite to a composting facility. The collected food waste materials are commingled with post-sorted green waste for composting. While composting the City's organic waste produces an environmentally friendly soil amendment as the end product there are several limitations. For example, composting requires a longer processing time and more land. Further, it does not produce renewable energy. Rather it requires energy for operation. In addition, continued implementation of composting can be affected by contracting and operational limitations of external entities. Therefore, to ensure long term sustainability and maintain better control over its diversion of organic waste, the City is considering diversion of the organic food waste into their existing wastewater treatment plant digesters.

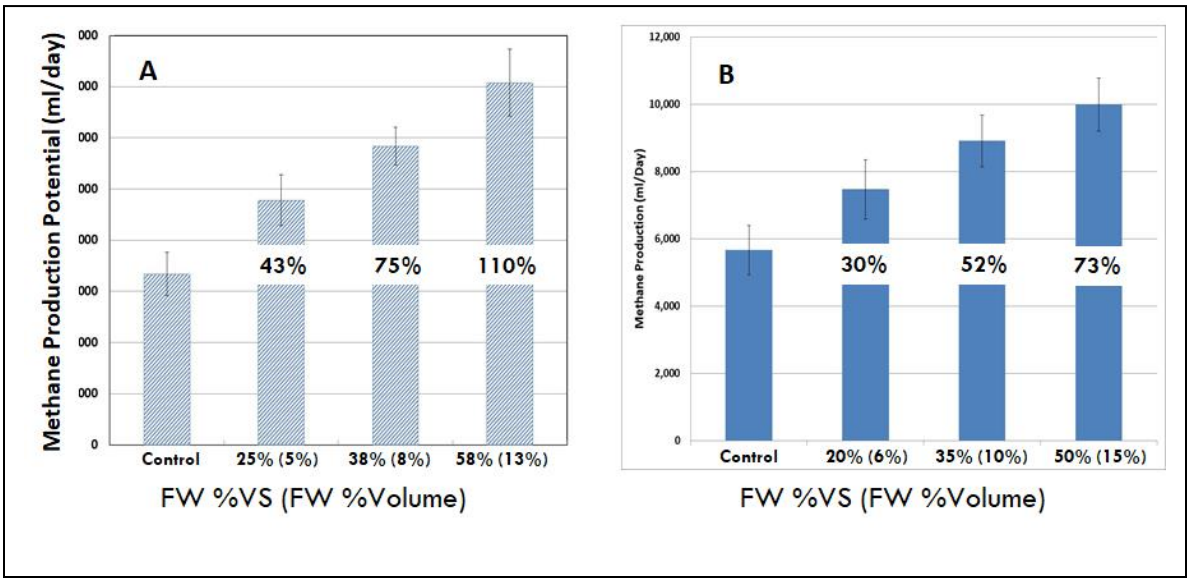
The City owns and operates a 31.7 million gallon per day (MGD) activated sludge wastewater treatment plant (OWTP). The solids treatment process consists of thickening of primary (gravity) and secondary sludge (DAF), anaerobic digestion, and dewatering. Thickened primary and secondary sludges are digested using three anaerobic digesters (two 90 feet diameter, 1.6 million gallon (MG) each and one 110 feet diameter, 2.4 MG). Currently one of the digesters is out of service pending rehabilitation. The biogas produced from the digesters is used for electricity generation using three (3) Kato PE2140B 500 KW generators owned and operated by the City at the Oxnard Wastewater Treatment Plant (OWTP). The City's Integrated Wastewater Master Plan indicates that, if all three digesters are available, the digesters will have sufficient capacity to receive all of the estimated wastewater sludge generated over the next ten years, with excess available capacity. This excess capacity can be used to receive organic wastes (e.g. food waste) from other sources to increase biogas production. Digestion of external organic

waste along with wastewater sludge, a process referred to as co-digestion, provides multiple benefits including boosting biogas production from the digesters and lowering greenhouse gas emissions from wastes that may otherwise be deposited in landfills. In addition, it meets the California mandate to divert organic waste from landfills.

Although co-digestion has the potential to yield several environmental and economic benefits, its widespread implementation has yet to be realized due to multiple technological barriers and knowledge gaps that still exist. Broadly, the barriers include challenges associated with preprocessing of food wastes and subsequent unintended side effects during co-digestion of food wastes with wastewater sludge. Some of the side effects to the digester operation may include, undesirable consequences to digester operations (such as volatile fatty acid (VFA) accumulation and process instability, foaming, low buffer capacity etc.), biogas quality, downstream impacts to biosolids generation and treatment (polymer demand, dewatered cake solids increase, centrate quality and cake odors). Therefore, the City desires to complete a feasibility study and bench scale test to evaluate the impacts of introducing food waste into the existing digesters.

Bench scale study data for two wastewater treatment plant showed that, while the co-digestion enhanced biogas production, the extent of benefits and the potential side effects varied with site specific conditions for each plant (Rajagopalan and Subramanian, 2020). For example, Figure 1 below shows the increase in biogas production due to the addition of various amounts of food waste into a bench scale digester for two different plants.

**Figure 1.** Bench scale study data - biomethane production at different food waste loadings at two plants. (The numbers on the bar show the percent increase in biogas due to food waste relative to control digester.)




Plant A uses activated sludge for secondary treatment and added post-consumer food waste in the test. Plant B uses an oxidation ditch for secondary treatment and added pre-consumer food waste. In general, the percent increase in biogas production due to food waste addition was higher for Plant A than for Plant B. For example, when volatile solids (VS) loading from the added food waste was approximately 35% of the VS loading from sludge, the *relative* increase in biogas production in Plant A and B (compared to respective control digester) were 75% and 52% respectively. Similarly, Table 1 below summarizes the increase in various cation levels in the centrate due to food waste addition at approximately 35% to 38% of sludge VS in plants A and B. In general, the percent increase in various

salts due to food waste addition is higher for Plant A than Plant B. An increase in cations like sodium and potassium may negatively impact dewatering characteristics. An increase in ammonia levels may impact struvite precipitation or nutrient levels in the effluent.

**Table 1.** Increase in cation levels in the centrate due to food waste addition[1]

| | **Plant A** | | **Plant B** | |
|---|---|---|---|---|
| | **Control Digester** | **Food Waste Digester[2]** | **Control Digester** | **Food Waste Digester[2]** |
| Sodium (mg/L) | 200 | 336 (68%) | 69 | 110 (59%) |
| Potassium (mg/L) | 112 | 352 (214%) | 123 | 184 (50%) |
| Calcium (mg/L) | 112 | 80 (-29%) | 53 | 58 (9%) |
| Magnesium (mg/L) | 63 | 82 (30%) | 12 | 12 (0%) |
| Ammonium (mg/L as N) | 1137 | 1454 (28%) | 921 | 995 (8%) |

1. VS contribution from food waste at 38% of sludge VS for plant A and 35% of sludge VS for plant B
2. Values in parenthesis represent the percent increase relative to control digester

In addition, economics of the co-digestion process are also impacted by site specific conditions including available digester capacity for food waste addition (and hence, the increase in biogas production), cost of food waste preprocessing, improvements needed for existing infrastructure (e.g. mixing system, digester cover renovation), new/repurposed tanks for food waste storage, odor control, biogas treatment and end use for biogas (e.g. electricity, vehicle fuel, pipeline injection).

Hence, the first step for successful implementation of a co-digestion program for the City is to perform a feasibility evaluation to obtain information on various factors discussed above regarding efficiency, economics and permitting. Subsequently, a bench scale study is required to verify and update the key assumptions made during the feasibility stage prior to design and full scale implementation.

**The objective of the proposed project is to:**

- Part I: Perform a feasibility evaluation for diversion of organic food waste into the City's wastewater treatment plant anaerobic digester, and
- Part II: Perform a bench scale study to verify and update the feasibility evaluation findings.

**The feasibility evaluation (Part I) will consist of:**

- Perform technical and economic evaluation of food waste pre-processing technologies for the City's organic wastes
- Evaluate digester capacity to accept food waste
- Evaluate infrastructure improvements required to accept the organic food waste at OWTP
- Perform "cost – benefit" analyses for implementation of co-digestion process
- Identify potential permit requirements

**The bench scale study (Part II) will:**

- Evaluate impact to digester health due to organic waste addition
- Estimate the increase in biogas production through the addition of organic waste
- Characterize biogas quality during co-digestion
- Identify impact to co-digested sludge quantity and characteristics
- Determine centrate quality from co-digestion process
- Refine feasibility study findings and identify optimum food waste loading conditions

In summary, the proposed study will evaluate the feasibility of diverting organic food waste from composting and landfills, minimizing greenhouse gas emissions, lowering transportation requirements and hence, pollutions from vehicles emissions, and utilizing excess digester capacity.

### 1b. Project Timeline

Part I of the study will be completed in 9 months and the Part 2 of the study will be completed in 12 months. Including final report, the project will be completed within 2 years.

## Criterion 2: Environmental Results and Performance Measurement (20 points)

### 2a. Outputs

The following outputs are anticipated from the proposed feasibility and bench scale studies:

**i. Diversion of Organic Food Waste:** The City is currently diverting about 838 tons of organic waste. However, the City estimates collection and processing of approximately 57,000 tons per year of food waste at full program participation. The data on food waste received at Del Norte and the amount of food waste available for diversion to anaerobic digestion will be identified in this study.

**ii. Increase in Biogas Production:** Past studies indicated that approximately 20 cubic feet of biogas can be generated per pound of VS from food waste destroyed in anaerobic digesters. The feasibility study (Part I) will evaluate the available digester capacity to receive food waste and associated impacts to digester operation through addition of different quantities of food waste. Recommendations will be developed that identify the optimum quantity of food waste that can be added to the digester. An initial estimation of increased biogas production through annual diversion of 838 and 57,000 tons of food are approximately 5.9 and 400 million cubic foot, respectively. During the bench scale study (Part II) the unit biogas production from food waste co-digesting with the OWTP sludge will be measured, and the estimate for total increase in biogas production will be verified.

**iii. Increase in Renewable Energy Production:** The biogas generated from co-digestion will be sent to the existing, on-site co-generation (cogen) facility. During the feasibility study, the increase in electricity generation from the biogas produced from food waste will be estimated based on the cogen system performance. At a 35% engine efficiency, the biogas generated from 838 and 57,000 tons of food waste will generate annually up to 0.34 and 23 million kWh, respectively.

**iv. Economics of Implementing Co-digestion Operation:** Another output from the feasibility study is a cost-benefit analysis of the proposed food waste diversion program. This life cycle analyses will include selection and cost estimation of food waste pretreatment equipment, cost for food waste storage facility including odor control and other accessories, digester upgrade costs, biogas treatment system upgrade costs, operation and maintenance cost, cost savings through enhanced biogas production, avoided tipping fee and reduced transportation costs.

**v. Reduction in Greenhouse Gas Emissions:** It is estimated that diversion of between 838 and 57,000 tons of organic food waste to OWTP would reduce GHG emissions by 164 and 16,245 metric tons of carbon dioxide equivalent per year (MT $CO_2e$/yr), respectively.

**vi. Reduction in Emissions from Truck Transportation:** Currently, food waste from Del Norte is trucked about 35 miles to the private contractor composting site. Upon implementation of the co-digestion program, the food waste will be sent to OWTP which is about 8 miles from Del Norte. Diversion of 838 and 57,000 tons of food waste will require 33 and 2,280 truck trips per year, (or a reduction of 900 and 61,500 truck miles per year), respectively. These assumptions will be verified in the study.

## 2b. Outcome

The outcome potential from this project may include the following:

**i. Provides comprehensive information to the City for development of organic diversion program:** The overall benefit of the EPA funded study is that it provides comprehensive information for the City to facilitate successful implementation of organic diversion to the existing anaerobic digester. It identifies the amount of food waste available for diversion, amount of food waste that can be received at the OWTP, best approach/technology for pre-processing of their food waste, infrastructure improvements needed to receive and co-digest food waste, biogas upgrades needed and permitting requirements/modifications required.

**ii. Facilitates stakeholders buy-in:** The information developed through EPA funding will allow stakeholders (public) to understand the environmental and economic benefits of the capital investment and construction activities related to the organic diversion program.

**iii. Supports implementation of California Bills:** Successful implementation of the organic diversion program helps the City to implement California Assembly Bills 32 and 1826 as well as Senate Bill 1383 that mandate diversion of organic waste from landfills and lower greenhouse gas emissions.

**iv. Facilitates lowering carbon footprint:** Successful implementation of the program will help divert organic waste from landfills and composting facilities and increase renewable energy production. Further, it will reduce emissions from transportation by lowering the hauling distance.

**v. Provides long term reliability:** Successful implementation of the co-digestion program will reduce the City's reliance on external facilities and factors for disposal of organic wastes and provide better control of organic waste disposal.

**vi. Helps increase landfill life:** Diversion of organic waste generated from the City creates additional capacity in landfills which, in turn, can increase the life of the landfill and delay construction of additional landfill facilities.

## 2c. Plans for Achieving the Project Results (Scope of Work)

**Feasibility Study (Part I) Tasks**

**TASK 1: Estimation of Quantity of Food Waste Available and Evaluation of Food Waste Pre-processing and Polishing Technologies**

This Task will involve the following steps:

i. Obtain and update the food waste generation data from the City's ER Division
ii. Project future food waste generation estimates from population and other data
iii. Identify available space for installation of preprocessing and polishing equipment
iv. Identify pretreatment technologies currently used to convert food waste into a debris-free slurry
v. Screen three technologies for detailed evaluation based on the quantity of food waste and other site-specific requirements (including available digester volume) of the City
vi. Perform detailed evaluation of the three technologies using cost as well as qualitative factors (e.g. maturity of the technology, separation efficiency, flexibility for expansion, footprint area)
vii. Rank order the technologies based on the above
viii. Develop planning level site layout for the highest ranked technology
ix. Use the cost estimate for the highest ranked technology for subsequent economic evaluation

**TASK 2: Condition Evaluation of Digesters and Digester Food Waste Loading Estimates**

This task will include: i) a condition assessment of the digesters (and other solids handling facilities) and ii) a desktop evaluation of the existing digestion capacity using available data. Accordingly, renovations and upgrades needed (e.g. cover repair, mixing system upgrades) will be identified, potential use of available infrastructure will be evaluated, and other project components that need to be considered in the economic evaluation will be identified. The purpose of this task is to determine available digester capacity and amount of food waste that can be added without possibly causing digester upsets. For example, an increase in organic waste addition can increase the biogas production, but may potentially increase the struvite precipitation potential or the amount of dewatered biosolids requiring disposal. Laboratory analyses of select samples, if required, will be performed.

**TASK 3: Evaluation of Biogas Treatment and Co-generation Requirements**

A desktop study will be performed to evaluate the capacity of the existing biogas/co-generation system to handle the excess biogas produced through co-digestion, identify additional treatment/co-generation systems required and evaluate the financial impact.

**TASK 4: Modeling energy production model and cost impact of increased biogas production**

Under this Task, a model will be developed for an hourly baseline energy production for the wastewater treatment plant, including existing biogas production rates and onsite cogeneration. Subsequently, energy usage at the plant and cost impacts of increased biogas production from the addition food waste will be evaluated. In particular, this Task will focus on the City's non-export interconnection agreement with the electric distribution service provider.

**TASK 5: Preliminary Cost-Benefit Analysis**

Based on the findings of the above Tasks, a preliminary cost-benefit analysis will be performed for installation of food waste pre-processing equipment and implementation of a co-digestion program for the City. The opinion of probable implementation cost and related benefits will be developed for two co-generation scenarios:

i. The amount of food waste pre-processing required based on the capacity of the existing digesters and biogas handling capacity.

ii. The amount of food waste pre-processing required based on one future scenario (e.g. anticipated maximum food waste loading, projected wastewater sludge flow rate in 2030).

The cost-benefit evaluation will include capital and O&M cost estimates for the identified food waste pre-processing/polishing system, avoided food waste disposal cost to the private entity, upgrades to biogas treatment/co-generation systems, O&M costs for operation of a co-digestion system at the OWTP, cost of infrastructure upgrades and additions for co-digestion at the OWTP, potential changes to sludge disposal costs and electrical savings due to increased biogas production.

**TASK 6: Identification of Permit Requirements**

Under this Task various permits related to installation, operation, transportation and disposal of food waste during pre-processing as well as co-digestion of food waste will be identified. Discussions will be held with various regulatory agencies (e.g. CalRecycle, Air Quality Management District), solid waste management facilities that have recently installed food waste pre-processing technologies, and wastewater treatment plants that recently implemented a co-digestion program to identify permit requirements for implementation of a food waste pre-processing and co-digestion program.

**Bench Scale Study (Part II) Tasks**

**Task 7: Work Plan Refinement**

Under this Task, the initial work plan for bench scale evaluation (described below) will be refined using the data from the feasibility study.

**Task 8: Extraction and characterization of Organic Waste**

It is estimated that the bench scale test will typically require up to 2 gallons of food waste per month. The City's source separated organic waste will be pre-processed using an appropriate technology and stored in a cold room for the bench scale study. The extracted SSO food waste will be analyzed for total and volatile solids, total and soluble COD, pH, alkalinity, ammonia, carbon:hydrogen:nitrogen (CHN) content. If necessary, respirometry tests will be performed to evaluate digestibility and biogas production potential of the extracted organic waste.

**Task 9: Co-Digestion Studies using City of Oxnard Sludge and Food Waste**

***Task 9.1: Bench Scale Digester Operation***

Four, 10 liter, semi-continuous laboratory anaerobic digesters will be operated at a solids retention of time (SRT) of approximately 20 days. One of the reactors (control) will receive only the wastewater sludge from the City at a VS loading rate at which the City's digesters are currently operated. The other three digesters will receive wastewater sludge and varying amounts of food waste. The digesters will be kept at a constant temperature of approximately 37 °C. The digesters will be fed daily with the appropriate feed, and the systems will be monitored for: influent and effluent total and volatile solids, total and soluble COD, pH, alkalinity, total nitrogen, phosphorus, gas production, gas methane content, and biogas odorants (e.g. H2S, methyl mercaptan). All tests such as solids and COD will be performed according to the appropriate Standard Methods and replicates to assure data quality.

***Task 9.2: Dewatering of Co-digested Solids***

After steady state conditions have been achieved in the digesters, the digester contents will be used for dewatering tests. The dewatering tests will evaluate the capillary suction time, optimum polymer dose, the dewatering rates, and the cake solids that are achieved from each case. The polymer currently used by the City for dewatering will be used in these studies. Standard protocols developed as part of a previous WERF funded study will be used. In addition, the filtrates will be analyzed for turbidity, COD, ammonia cation levels and struvite formation potential.

***Task 9.3: Odor Production from Co-digested Solids***

The effect of cake storage on odorant potential will be analyzed by storing duplicate samples in 160 mL serum bottles at 25 °C, and measuring headspace odor causing chemicals (e.g. $H_2S$, methyl mercaptan, methane) using standard protocols.

**Task 10: Technical and Economic Evaluation**

The Task 5 data (feasibility study) will be updated using the bench scale study data and used to refine the design and operating criteria for the co-digestion program. In addition, economic analyses will be performed to evaluate the impact of implementing a co-digestion program for the City.

**TASK 11: Draft and Final Technical Memorandum**

The results of the Part I and II studies will be summarized in a report and submitted to EPA.

### 2d. Transferability of Information to Other Communities

The type of food waste generated and treatment processes at the City are commonly present in many Cities. Hence, results from this study including factors affecting selection of pre-processing technologies, general estimate of biogas production from food waste and sludge, typical food waste receiving and handling and permitting requirements are readily transferable to other communities.

## Criteria 3: Programmatic Capability and Past Performance Criterion (15 points)

### 3a. Past Performance in Completing and Managing Projects

The City of Oxnard performed work on the following EPA and non-EPA grants in the last three years.

**Table 2.** City of Oxnard Grants Performed in the Last Three Years

| Grantor | Period | Grant Number and Name | Grant Funding | Grant Scope |
|---|---|---|---|---|
| US EPA | 9/1/2013 - 12/31/2018 | JT-99T03501 Environmental Workforce Development and Job Training Grant | $200,000 | To integrate training in hazardous materials and wastewater into the Oxnard City Corps program, a job training program for 18-25 year old youth managed by the City of Oxnard. |
| California Department of Resources Recycling and Recovery (CalRecycle) | 1/20/2017 - 6/28/2019 | RBC28-16-0018 Beverage Container Recycling Grant Program | $249,000 | To increase recycling at multi-family units in the City of Oxnard. |
| CalRecycle | Annual Cycle | OPP10-19-0168 Used Oil Recycling Grant | $56,300 | To reduce the potential for illegal disposal by increasing used oil, filter collection, recycling opportunities, public education, source reduction, and reuse of used oil, and the prevention of stormwater pollution from used oil. |
| CalRecycle | Annual Cycle | CCP-19-215 Beverage Container Recycling Grant Program | $51,400 | To increase recycling at multi-family units in the City of Oxnard. |

### 3b. History of Meeting Reporting Requirements

The past performance of the City's projects (Table 2) were managed effectively by various City staff. Reporting requirements were met regularly throughout the projects. Acceptable final technical and financial reports were submitted on schedule for all the projects.

### 3c. Organizational Experience and Plan for Project Completion*:*

In addition to the grant programs, the City's wastewater division and ER division have an average annual budget of approximately $40 million and $60 million, respectively. With a total staff of 70 at wastewater and 170 at ER, the Divisions have a history of completing these projects successfully as certified in the City's past audit reports. The City will use its project management experience to coordinate with EPA, project partners and internal divisions to ensure the project is completed on schedule and budget.

## Criterion 4: Project Sustainability (15 points)

### 4a. Promote and continue efforts to support AD after EPA funding has ended

The City has recognized energy conservation, renewable energy production, and climate change as critical issues related to long-term sustainable development. To this effect, the City has incorporated energy efficiency and conservation goals and policies in its 2030 General Plan to guide government operations and future development. The City has developed an Energy Action Plan (EAP) which provides direction for the City to use energy more efficiently and thereby reduce greenhouse gas (GHG) emissions related to both City government and the greater community compared to a "business as usual" scenario. As part of the adoption of this EAP, 18 near-term and mid-term programs tailored specifically for reducing energy consumption and increasing the use of renewable energy production were developed. These programs are in various stages of City Council approvals and implementation. Out of the 18 projects listed in the EAP, one of the near-term projects addresses increasing on-site biogas-electricity generation at the OWTP. The grant funding from this opportunity will directly help conduct the feasibility for this waste to energy biogas project and assist in its implementation.

The OWTP has been producing on-site energy through AD biogas production and cogeneration energy production since the mid-1970's. The system currently produces approximately 35% of the total energy demand at the OWTP. The City is committed to not only maintaining the current on-site energy production but increasing the output through capital improvements and new programs. The rehabilitation of all three digesters has been identified in the Integrated Master Plan and 5-year capital improvement program. The design of the improvements to the out-of-service digester is complete with construction planned over the next year. This will increase current digester capacity by 40%. In addition to improvements to the digesters, the City is evaluating and will be implementing a fats, oil and grease (FOG) program in the near future. The FOG program will enhance overall gas and electricity production.

### 4b. Extent to which the project supports a state or local mandate, policy, or community priority to remove food waste and organic materials from the municipal waste streams

As described earlier, the proposed study directly supports the goals of Assembly Bills (AB 32, AB1826) and Senate Bill (SB 1383) that mandate diversion of organic wastes and reduction of GHG emissions.

## Criterion 5: Effective Partnerships (10 points)

### 5a. Partnership to Support the Proposed Project

The project will be led by Jan Hauser, Oxnard Wastewater Division Manager. He will be assisted by the City's wastewater staff, engineering department and ER Division. Mr. Hauser has nearly 30 years of experience in both the public and private wastewater sectors. His experience includes managing wastewater treatment plants to overseeing the planning, design and construction of wastewater projects. Jan has a Bachelor of Science degree in Electrical Engineering and Master of Science Degree in Civil and Environmental Engineering with a focus on water. Jan holds a Professional Engineering license in the state of Michigan and was previously a certified water operator. Further **The Energy Coalition (TEC) as the partner for this study.** TEC is a California-based non-profit organization with over 45 years of designing and implementing strategies that transform energy use and generate Capital. TEC implements the Southern California Regional Energy Network (SoCalREN) Public Agency Programs, which offers a suite of no-cost energy project identification and development services to public agency customers of Southern California Edison and Southern California Gas. The City of Oxnard is currently enrolled in SoCalREN program and actively working with TCE to implement energy efficiency programs. The City will select a consultant with significant experience in the proposed EPA project activities to perform the feasibility studies and bench scale evaluation.

**5b. Role of Each Partner in the Proposed Project**

The City of Oxnard will be responsible for project coordination with the EPA and coordinating activities among OWTP, Engineering Department, ER, City's Grants Department, TEC and the consultant. In his role as the Wastewater Division Manager, Jan has been managing several projects requiring coordination among various internal divisions and external entities and is highly qualified to meet the demands of this project. The consultant will be responsible for performing the feasibility study (except Task 4), coordinating laboratory activities of bench scale studies and preparing draft and final report for the City. TEC will perform Task 4 of the feasibility study and assist the City and the consultant with any modeling, review and QA/QC requirements.

## Criterion 6: Budget and Expenditure of Awarded Grant Funds (10 points)

The estimated total budget for this project is $246,256. Funding requested from the EPA is $182,630. The remaining budget will be provided by the City and TEC. The in-kind match by the City is $37,126. The estimated budget for the Feasibility evaluation is approximately $124,130 out of which $26,500 will be provided by TEC. The estimated budget for the bench scale testing is approximately $85,000. The estimated labor budget for the consultant for feasibility and bench study activities is approximately $120,000. The budget for laboratory bench scale study activities is approximately $60,000. Additional information is provided in the separate budget narrative statement. The City will use its established audit and accounting mechanisms, project monitoring protocols, periodic reports and meetings to ensure that the awarded funds are expended in a timely and effective manner.

## Criterion 7: Voluntary Leveraging (5 points)

In addition to the in-kind participation of Oxnard staff, the project will be coordinated with and enhanced by other on-going short and long term efforts by the City. As previously mentioned, the City is undertaking a major upgrade and rehabilitation project of the OWTP. The project includes the upgrade of nearly all existing unit processes including all three digesters. Phase 1 has recently been completed which included the complete overhaul of all three cogeneration units. Phase 2 is nearing design completion and includes the complete rehabilitation of digester #2. The project should be bid late this summer with construction estimated to be complete in 2022.

Additionally, the City works hand-in-hand with the Energy Coalition (TEC) identifying and evaluating energy conservation measures. Projects currently being evaluated by TEC include the upgrade of the existing activated sludge aeration system, implementation of gravity discharge of treated effluent, inclusion of Chemically Enhanced Primary Treatment and the removal of trickling filters from the biological treatment system. TEC resources will be leveraged to support the project through data supply and evaluation, quality reviews and benchmarking. Finally, their cogeneration contractor (GIE) will support data evaluation and alternative identification to increase the electrical output of the existing cogeneration system.

**Reference**

Rajagopalan, G. and Subramanian, B. 2020. Co-digestion of organic wastes. Pacific Water Conference, Honolulu, HI. February.

Attachments:

- Budget Table and Narrative

- Letter of Support